

CIR Acceptance Plan

Fluids and Combustion Facility Combustion Integrated Rack

Preliminary
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AUTHORIZED by CM when under FORMAL Configuration Control	
Date	Signature
10/26/00	/s/ Robert H. Van Niel



Prepared For:
National Aeronautics and Space Administration
John H. Glenn Research Center
Microgravity Science Division
Cleveland, Ohio 44135



Prepared By:
Federal Data Corporation
Under Contract NAS3-99155
2001 Aerospace Parkway
Brook Park, Ohio 44142



PREFACE

The National Aeronautics and Space Administration is developing a modular, multi-user experimentation facility for conducting fluid physics and combustion science experiments in the microgravity environment of the International Space Station. This facility, called the Fluids and Combustion Facility, consists of three test platforms: the Fluids Integrated Rack, the Combustion Integrated Rack, and the Shared Accommodations Rack. This document describes the plan for accepting the CIR deliverable hardware, where "acceptance" is the range of activities which validate the hardware for installation on board the International Space Station.

**CIR ACCEPTANCE PLAN
FOR THE
FLUIDS AND COMBUSTION FACILITY
COMBUSTION INTEGRATED RACK**

Prepared By: /s/ Eugene Koszenski
Eugene Koszenski
Systems Engineering
Analex Corporation

Date: 10/06/00

Approved By: /s/ Thomas Ziemianski
Thomas Ziemianski
FCF Product Assurance
Hernandez Engineering, Inc

Date: 10/06/00

Approved By: /s/ Nora Bozzolo for JW
Jon Wetherholt
FCF Product Development Team Lead - Systems
Analex Corporation

Date: 10/06/00

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FLUIDS AND COMBUSTION FACILITY
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Concurred By: /s/ Andrew M. Peddie

Andrew M. Peddie
FCF Deputy Director
Federal Data Corporation

Date: 10/24/00

Concurred By: /s/ Christopher J. Pestak

Christopher J. Pestak
FCF Director
Analex Corporation

Date: 10/25/00

REVISION PAGE **CIR ACCEPTANCE PLAN**

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1.0 INTRODUCTION

This document sets forth the plan for conducting hardware and software acceptance activities on the Fluids and Combustion Facility (FCF) Combustion Integrated Rack (CIR). This experimentation facility is being developed for the National Aeronautics and Space Administration (NASA) Glenn Research Center (GRC) for installation on board the International Space Station (ISS). The CIR is intended to provide a facility for examining combustion phenomena in a microgravity environment.

1.1 Background.

The environment of space offers extended opportunities for critical measurements needed to understand and resolve practical combustion problems. These measurements are most effective for large, steady, slow-moving and symmetric flames that provide good temporal and spatial resolution. Unfortunately, this type of flame is not observed on Earth because gravity causes hot flame gases to rise, leading to unsteady, fast-moving and distorted flames typified by candles and campfires. These phenomena virtually disappear in the microgravity environment of space. Thus, in much the same way that observations in space avoid the disturbances of the Earth's atmosphere for astronomy, observations in space avoid the disturbances of the Earth's gravity for combustion.

The CIR is one of three International Standard Payload Racks (ISPRs) that comprise the FCF (the others being the Fluids Integrated Rack and the Shared Accommodations Rack), and is scheduled to be the first FCF rack launched and installed on board the ISS. The ISPR houses the equipment to be used for performing microgravity experiments and provides all of the mechanical interfaces to the U.S. Laboratory Module on board the ISS. The CIR, illustrated in Figure 1, is modular in design and consists of the following major components (in addition to the ISPR): An Optics Bench; a Fuel Oxidizer and Management Assembly; a Combustion Chamber with replaceable windows; replaceable Science Diagnostics; avionic systems including power, control and software; an Environmental Control System; an Active Rack Isolation System; a Space Acceleration Measurement System (SAMS) sensors; and interfaces for replaceable experimenter specific hardware.

The purpose of the FCF CIR is to provide early access to combustion science research opportunities in microgravity conditions on-board the ISS and, ultimately, a sustained, systematic combustion science research facility in an extended microgravity environment. The concept behind the FCF CIR is to provide up to 90% of the required hardware and infrastructure to perform the majority of combustion experiments. The remaining hardware required will be developed by the experiment specific hardware development teams and will be launched on re-supply missions and integrated into the CIR on orbit.

1.2 Purpose of this plan.

This document defines the preliminary version of an Acceptance Plan, including reviews, tasks, and responsibilities, for the delivery of CIR flight and ground support hardware/software and the supporting Acceptance Data Package (ADP). This Plan defines the elements of the CIR acceptance process and the success criteria required for delivery and turnover of the CIR to the NASA GRC FCF Project Office.

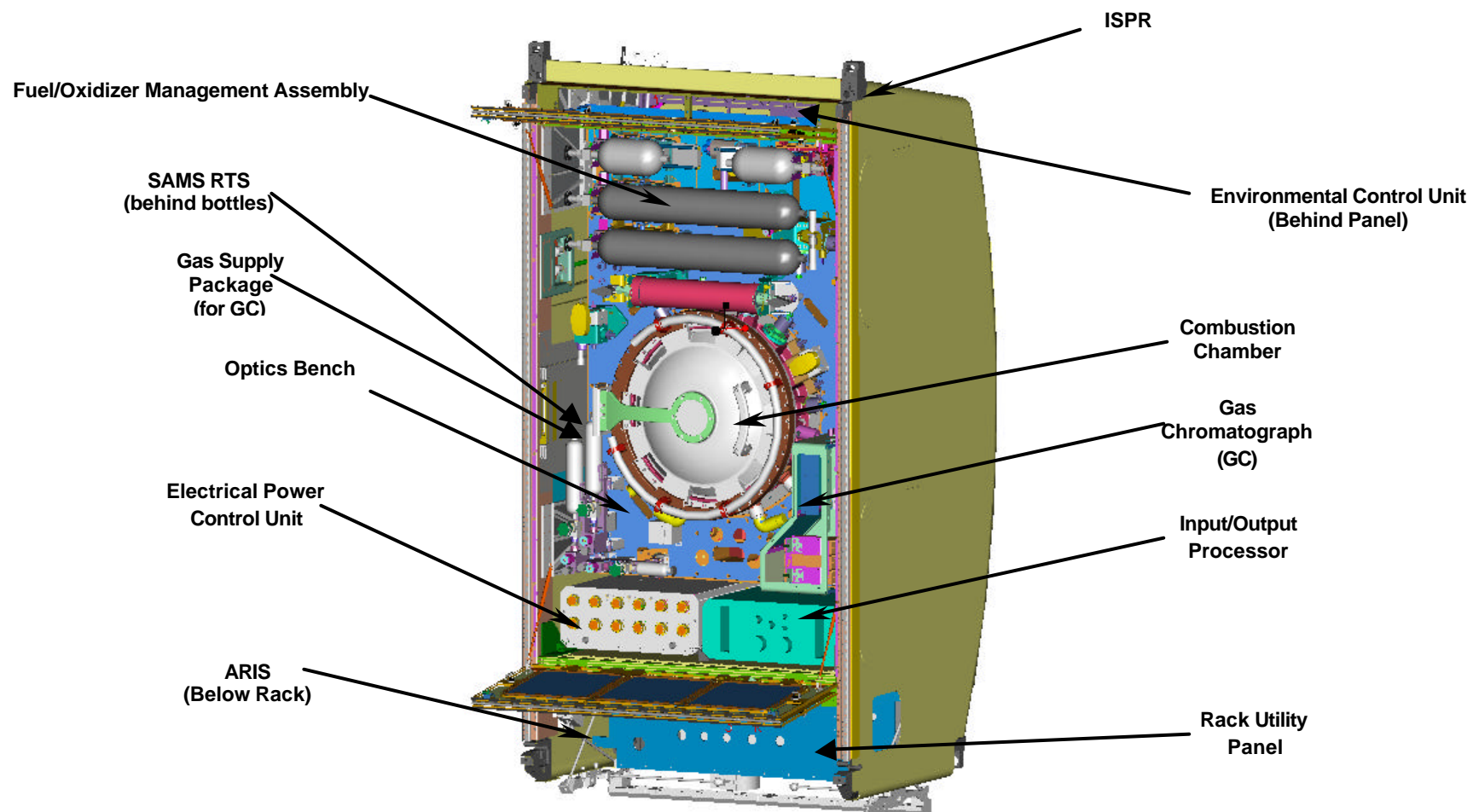


Figure 1 Combustion Integrated Rack (CIR)

1.3 Scope.

The processes and responsibilities defined in this document apply to the FCF CIR development team and are applicable to the CIR flight hardware configuration item (CI), associated computer software configuration items (CSCI), Ground Support Equipment (GSE), and spare hardware items. This Plan describes the top-level acceptance activities through hardware delivery to the launch site. Acceptance activities at the launch site are beyond the scope of this Plan.

1.4 Objectives.

The objectives of this Plan are threefold:

1. To set forth the sequence of events required to approve and accept the CIR for delivery to the Kennedy Space Center (KSC) and subsequent installation on board the U.S. Laboratory Module of the International Space Station;
2. To define a preliminary set of steps for each event in the acceptance sequence; and
3. To establish a framework for defining, in advance of their need date, the activities that should be performed to accept the CIR.

This Plan will be upgraded and expanded as the program activities evolve.

1.5 Plan organization.

This Plan includes two sections in addition to this introduction. Section 2 provides a listing of the source documents used in the development of this Plan. Section 3 presents the proposed acceptance activities, which include a Functional Configuration Audit, an Acceptance Test Readiness Review (ATRR), a Physical Configuration Audit (PCA), a CIR Acceptance Test, and a final System Acceptance Review (SAR).

2.0 DOCUMENTS

This section lists specifications, models, standards, guidelines, handbooks, and other special publications. These documents have been grouped into two categories: applicable documents and reference documents.

2.1 Order of precedence for documents.

In the event of a conflict between this document and other documents referenced herein, the requirements of this document shall apply. In the event of a conflict between this document and the contract, the contractual requirements shall take precedence over this document. All documents used, applicable or referenced, are to be the issues defined in the Configuration Management (CM) contract baseline. All document changes, issued after baseline establishment, shall be reviewed for impact on scope of work. If a change to an applicable document is determined to be effective, and contractually approved for implementation, the revision status will be updated in the CM contract baseline. The contract revision status of all applicable documents is available by accessing the CM database. Nothing in this document supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.2 Applicable documents.

The following documents are applicable to this Acceptance Plan to the extent specified herein.

2.2.1 NASA documents.

DOCUMENT NO.	TITLE
SSP 41170	<i>Configuration Management Requirements, International Space Station Program</i>
SSP 41172	<i>Qualification and Acceptance Environmental Test Requirements, International Space Station Alpha Program</i>
SSP 50431	<i>Space Station Program Requirements for Payloads</i>
SSP 52054	<i>ISS Program Payloads Certification of Flight Readiness Implementation Plan, Generic</i>

2.2.2 Reference documents.

The documents in this paragraph are provided only as reference material for background information and are not imposed as requirements.

DOCUMENT NO.	TITLE
MIL-STD-1521	<i>Technical Reviews and Audits for Systems, Equipments, and Computer Software</i>
MIL-STD-1540	<i>Test Requirements for Space Vehicles</i>
SSP 30695	<i>Acceptance Data Package Requirements Specification, International Space Station Program</i>
SSP 41172	<i>Qualification and Acceptance Environmental Test Requirements, International Space Station Program</i>
SSP 41173	<i>Space Station Quality Assurance Requirements, International Space Station Program</i>
SSP 50287	<i>Hardware/Software Acceptance Process, International Space Station Program</i>
D684-10284-01	<i>Acceptance Review Procedure, International Space Station Program</i>
CIR-PLN 0044	<i>CIR Engineering Model Development/Qualification Test Plan, Fluids and Combustion Facility Combustion Integrated Rack, Federal Data Corporation</i>
FCF-DOC-0015	<i>Guidelines for EMC Verification of FCF Subsystems, Fluids and Combustion Facility, Federal Data Corporation</i>
FCF-DOC-0016	<i>Qualification and Acceptance Testing - Thermal Requirements, Fluids and Combustion Facility, Federal Data Corporation</i>
FCF-PLN-0021	<i>Random Vibration Test Plan, Fluids and Combustion Facility, Federal Data Corporation</i>
FCF-PLN-0023	<i>Acoustic Control Plan, Fluids and Combustion Facility, Federal Data Corporation</i>
FCF-PLN-0037	<i>Microgravity Control Plan, Fluids and Combustion Facility, Federal Data Corporation</i>

3.0 ACCEPTANCE PROCESS

The acceptance process for the CIR is, essentially, a sequence of events which start prior to hardware acceptance testing and continue up to hardware delivery. The objective is to verify in a stepwise fashion the hardware and software compliance with design and performance requirements. The acceptance activities for the CIR will include the following four elements:

1. Conducting a Functional Configuration Audit, to verify that the as-designed hardware and software functional requirements defined by the development specifications have been met.
2. Conducting an Acceptance Test Readiness Review, to verify that the hardware and software are ready to test.
3. Conducting a Physical Configuration Audit, to verify that the as-built hardware/software meets design requirements.
4. Performing the CIR Acceptance Test, to verify that the CIR meets performance requirements.
5. Conducting an Acceptance Review, to review the overall acceptance process and approve the CIR for delivery.

The sequence of these events is as shown above. The timeline for these activities is TBD.

Definition of the timeline will include considerations to:

1. Ensure that the acceptance process remains focused, therefore a shorter time frame for the acceptance sequence, and
2. Reduce the probability that unplanned changes may occur during the acceptance process which necessitate re-performing a previously completed review/activity.

A preliminary list of acceptance process milestones is presented in Table I. As the milestone list and schedule for hardware acceptance become better defined, "start" and "complete" dates can be added to each milestone. This will then form the basis for a formal schedule of events for the CIR acceptance activities.

3.1 Functional configuration audit.

The FCA is a formal examination of qualification test, demonstration, inspection, similarity, and analysis data to verify the actual performance of the CI/CSCI complies with the Development Specification in the as-designed configuration. The primary product of the FCA is a review of the extent of completion of all required development tests and verifications. Successful completion of the FCA will determine that the CI/CSCI is adequate for acceptance testing and leads to scheduling of the Physical Configuration Audit.

3.2 Acceptance test readiness review.

An Acceptance Test Readiness Review (ATRR) shall be conducted as a formal review of the contractor's readiness to begin formal hardware testing. The ATRR shall be conducted after all hardware/software test plans and procedures are available (prepared and approved) and rack component and software integration are complete. The purpose of the ATRR is for the contractor to demonstrate to NASA that it is ready to begin hardware Acceptance Testing.

TABLE I ACCEPTANCE PROCESS PRELIMINARY MILESTONE LIST

The following represent a preliminary set of milestones to guide the CIR acceptance process. The list will be expanded and *start* and *complete* dates added as the hardware testing and delivery schedules become more firm.

Item No.	Activity/Milestone Description
1	Review the results of Engineering Model and all other in-process tests
2	Prepare the Acceptance Test Plan
3	Get Acceptance Test Plan approved
4	Prepare the Acceptance Test Procedure (ATP)
5	Get the ATP approved
6	Assemble an Acceptance Data Package “blank book”
7	Conduct internal review of preparedness
8	Prepare schedule of acceptance activities
9	Obtain concurrence of activities schedule with NASA
10	Conduct/participate in an Operations Readiness Review
11	Receive OK from NASA to proceed with the acceptance process
12	Conduct/participate in an Acceptance Test Readiness Review
13	Receive OK from NASA to proceed with the acceptance process
14	Conduct hardware Physical Configuration Audit
15	Receive OK from NASA to proceed with acceptance process
16	Conduct CIR Acceptance Test
17	Conduct CIR Acceptance Review
18	Receive NASA acceptance approval and approved shipping document
19	Pack/package hardware for delivery
20	Deliver hardware to KSC

Test procedures shall be evaluated for compliance with test plans and descriptions and for adequacy in accomplishing test requirements. The results of informal testing and any updates to the operation and support documents shall also be reviewed. A successful ATRR is predicated on the NASA's determination that the test procedures and informal test results form a satisfactory basis for proceeding into formal Acceptance Testing. The guidelines to be followed in conducting the ATRR includes, but is not necessarily limited to, the following:

- Requirements changes that have been approved since the Critical Design Review (CDR).
- Design changes which have been incorporated since CDR and which may impact testing.
- Hardware and software test plans and descriptions.
- Hardware and software test procedures.
- Test resources, including facilities and equipment (both contractor-owned and Government furnished).
- Test limitations.
- Hardware/software problems status and all known discrepancies.
- Documents which have been updated since CDR.

Participants in the ATRR shall include representatives from Engineering, Test Engineering, Quality Assurance, Configuration Management, and Program Management from both the contractor and NASA. Individuals from other functional groups may be asked to participate, as required. The meeting will be called and chaired by the representative of the contractor's Quality Assurance function. The end product of the ATRR shall be (1) a report of the meeting minutes of the ATRR, published and distributed by the contractor, and (2) written notification from NASA acknowledging satisfactory completion of the ATRR and authorizing the contractor to proceed with the acceptance process.

3.3 Physical configuration audit.

The Physical Configuration Audit is the formal examination of the as-built version of the CIR against its design documentation in order to establish the product baseline. The PCA shall be an in-process audit conducted prior to the hardware Acceptance Test and will be conducted per the requirements defined in SSP 41170. The PCA shall verify that the released engineering drawings and product definition documentation adequately and accurately describe the as-designed configuration of the item and the related as-built configuration properly incorporates those requirements. Upon completion of the PCA, the final configuration of the CIR will be established and will be known as the Product Baseline (PBL). The PCA will include, but not necessarily be limited to, the following:

- Identification of items to be audited/accepted
- Product specification
- List of approved changes
- List of outstanding changes and/or required changes not completed
- Shortages list
- Acceptance Test Procedure
- Engineering drawings (including an index with revision letters)
- Operating, maintenance, and illustrated parts breakdown manuals

- Proposed shipping document (Form DD250, or other)
- Approved nomenclature and nameplates
- Software manuals; Software Version Description Document
- Quality assurance program findings and status
- Current approved hardware specification, S/W Requirements Specification, and Interface Requirements specification
- Lists of all deviations/waivers
- As-built parts lists, including serial/lot numbers where applicable
- Assembly documents list (process plans, assembly procedures, etc.)

The PCA also determines that the acceptance testing requirements prescribed by the documentation are adequate for acceptance of the flight hardware. The PCA includes a detailed audit of engineering drawings, specifications, technical data, tests utilized in production of the hardware, and design and computer software documentation. The review shall include an audit of the released engineering documentation and quality control records to make sure the as-built or as-coded configuration is reflected by this documentation, and review of appropriate software design documents (Specification, Version Description Document, or equivalent documents).

Participants in the PCA shall include representatives from Configuration Management, Engineering, Quality Assurance, and Program Management from both the contractor and NASA. Individuals from other functional groups may be asked to participate, as required. The meeting will be called and chaired by the representative of the contractor's Configuration Management function. The end product of the PCA shall be (1) a report of the meeting minutes of the PCA, published and distributed by the contractor, and (2) written notification from NASA acknowledging satisfactory completion of the PCA and authorizing the contractor to proceed with the hardware Acceptance Test.

3.4 Acceptance testing.

Acceptance Tests are the required formal tests conducted to demonstrate acceptability of an item for delivery. They are intended to demonstrate performance to specification requirements and to act as quality control screens to detect deficiencies of workmanship, material, and quality.

The CIR Acceptance Test will be the final hardware operational test prior to delivery and will be governed by three documents: The Acceptance Test Plan, the Acceptance Test Procedure, and the Acceptance Data package. (The Acceptance Test Plan and Acceptance Test Procedure may be prepared as a single document under one cover. For purposes of this Plan, they will be assumed to be separate documents).

3.4.1 Acceptance test plan.

An Acceptance Test Plan shall be prepared which specifies the types of acceptance tests to be conducted based on a function-by-function mission analysis. The Acceptance Test Plan for the CIR flight hardware shall be based on the tests and test results used in and derived from testing of the CIR Engineering Model hardware. Test objectives, test environments, hardware configurations, and accept/reject criteria shall be defined in the Acceptance Test Plan and shall use SSP 41172 and MIL-STD-1540 as guidelines in defining acceptance tests. The accept/reject criteria shall define acceptable requirements to permit a determination of whether material,

manufacturing, and assembly specifications have been satisfied and whether the hardware is flightworthy.

As appropriate, the test plan shall define alternative plans to cover interruption of test, failure of test articles to pass test, revision of test procedures, and modifications or adjustments to the test article undergoing test. The test plan may be updated to reflect changes in the test program; tests may be added or changed because of design changes or to provide additional confidence in the adequacy of the hardware, or tests may be deleted because of confidence gained through previous tests, if the test articles were sufficiently similar. The test plan shall be prepared in enough detail to permit an evaluation of the scope of the acceptance test and the level of confidence it will produce.

3.4.2 Acceptance test procedure.

An Acceptance Test Procedure (ATP) shall be prepared which describes in stepwise detail each test that will be performed during the hardware acceptance test. The contractor shall establish procedures for performing all required tests in accordance with the approved Acceptance Test Plan. The test procedures will include test data sheets and shall be in agreement with the test requirements and objectives listed in the test plan. Each procedure shall include clearly defined accept/reject criteria, which should reflect the minimum requirements that the hardware must achieve to be accepted.

Traceability shall be provided from the specified requirement to the test procedure. The test procedures shall cover all operations in sufficient detail so that there is no doubt as to what is to be done. The pass/fail criteria shall be defined for every test

3.4.3 CIR acceptance testing.

The CIR Acceptance Test will be a full-system test conducted to verify the adequacy of the entire rack to perform its mission unless it can be clearly shown that verification of adequacy can be demonstrated through lower level tests. Acceptance testing will follow hardware/software qualification testing, which will be performed on the CIR Engineering Model unit.

Acceptance testing of the CIR shall follow to the letter the tests and test sequence defined in the approved Acceptance Test Procedure and ATP. The ATP will include tests defined in the contractor's Acoustic Control, Microgravity Control Plans and Vibration and Thermal test plans. The acceptance test shall be supervised by the contractor's Quality Assurance function and shall be witnessed by Quality Assurance and Engineering personnel from both the contractor and NASA. Test data taken during the testing shall be recorded on the test data sheets as the testing occurs. Representatives of NASA and the contractor shall provide witness approval signatures on the test data sheets for each successfully completed test.

3.5 Acceptance data package.

An Acceptance Data Package (ADP) shall be prepared for the CIR flight hardware. The ADP shall be prepared using SSP 30695 as a guide. Document format, content, and order of presentation shall be tailored to SSP 30695. The test data sheets compiled during the CIR Acceptance Test shall be included as a section in the ADP, unless directed otherwise by NASA.

The ADP shall be prepared concurrently with the deliverable item and delivered simultaneously with the hardware and/or software. The ADP shall provide a complete and verified status of the CIR flight hardware and shall be maintained by NASA once the hardware is delivered.

Supporting documentation and sub-tier (subcontractor/supplier) ADPs, shall be provided at time of delivery and shall be identified appropriately with cross reference to the parent ADP. Minimum data elements for each section, as specified in SSP 30695 and noted on the ADP index sheet, shall be included with each deliverable ADP.

3.6 System Acceptance Review.

A System Acceptance Review is performed to assure that the product being presented conforms to contract and specification requirements, that all processes affecting the quality of the product such as testing, inspection, reviews, etc., are complete, and that the supporting ADP is complete and complies with SSP 30695. The SAR is the final review activity in the hardware acceptance process and results in the transfer of the hardware and software ownership (if applicable) and subsequent delivery of the product.

A System Acceptance Review in accordance with SSP 50431 shall be conducted on the CIR to verify that no activity has occurred to change the configuration of the CIR since the PCA. It shall include the identification and acceptance of open work by the using site after delivery. Preplanned, assigned, unplanned, or deferred work associated with the item being subject to the SAR, will be presented in summary at the review and agreed upon by Project Management. Issues or concerns derived from the work transfer or deferral shall be identified to management at this review for resolution. Upon completion and as part of the CIR SAR for flight hardware and software, an endorsement of the Certification of Flight Readiness (CoFR) shall be prepared per SSP 52054 and DD250 shall be executed by NASA and the contractor. A list of Acceptance Review items to be addressed is provided in Table II.

The SAR shall be conducted as a joint, single panel forum composed of representatives from the Quality Assurance, Configuration Management, Engineering, and Program Management from both NASA and the contractor. The review shall be co-chaired by the ISS Payloads Office and the Microgravity Research Program Office. During the SAR, panel members shall review supporting documentation, when appropriate, to ensure any changes to the product baseline have been authorized and incorporated, testing is completed, open items are documented and authorized, the Acceptance Data Package is complete, and the product is ready for delivery.

The completion of the review is indicated by the signing of the minutes prepared by the co-chairs of the SAR and submission of the appropriate transfer document (i.e., DD Form 250 or DD Form 1149) to the NASA designated representative for approval signature.

TABLE II SYSTEM ACCEPTANCE REVIEW ELEMENTS

The following table lists the elements that should be addressed, as a minimum, during the System Acceptance Review and the functional groups responsible for the various elements.

Acceptance Review Elements	Functional Group			
	Config. Manage.	Engineering	Quality Assur.	Program Manage.
Identification of product being reviewed (specification number, drawing number, nomenclature, part number, serial number, contract number).	X			
Copy of approved specification.	X	X		
A summary of test and checkout operations and results with anomalies encountered, failure history, remedial actions, and recurrence control.		X	X	
The status of any open work, including open items from previous reviews, shortages, non-conformances, unincorporated engineering changes, etc.	X	X	X	
Interface Control Documentation (approved interface control drawings or documents, where applicable).		X		
A comparison of the approved product baseline (PBL) and the configuration of the item being presented for acceptance and rationale for any deltas from approved PBL.	X	X	X	
The test procedure and test data for all end item acceptance tests including strip charts, deviations, and other data applicable to evaluate test records.		X	X	
A completed, deliverable Acceptance Data Package (ADP) per SSP 30695.	X	X	X	X
Records of all open non-conformances occurring during manufacturing and test of the item.			X	
Shipping Document (DD Form 1149, DD Form 250, or equivalent) and ship short authorization, if required.				X
Handling, shipping, storage, preservation, packing, and packaging instructions, including environmental constraints, identification of hazards, and maintenance requirements and user manuals.			X	
Supporting documentation which may be required to establish equipment/software acceptability should be readily retrievable (i.e., engineering drawings, schematics, supplier ADPs, test specifications, closed non-conformances, fabrication and inspection test records, action items, etc.) to resolve discrepancies noted during AR.	X	X	X	X

3.6.1 Acceptance review readiness assessment.

An Acceptance Review Readiness Assessment shall be conducted by the contractor's Quality Assurance organization 10 days prior to the scheduled SAR to determine the readiness of the product for acceptance and delivery. A Readiness Assessment Checklist and a draft SAR agenda shall be prepared by the contractor and submitted to NASA prior to the assessment. NASA shall review the Checklist prior to the announcement of the Readiness Assessment meeting.

The contractor's Quality Assurance organization is responsible for notification of all prospective Readiness Assessment attendees and distribution of the checklist and agenda prior to the meeting. The Readiness Assessment meeting may be held as a table top meeting of all participants or as a conference telephone call. Guidelines for performing the Readiness Assessment are provided in Table III.

During the Readiness Assessment, the contractor's Quality Assurance representative shall provide status of the items listed on the checklist. Based on the completion and readiness of the requirements for SAR (i.e., completed ADP, open work identified and authorized, shipping document prepared, etc.), participants shall determine if the product is ready for SAR and subsequent delivery.

3.6.2 Agenda.

The SAR Agenda will list pertinent information identifying the SAR item. It will also identify the level of the SAR, date/time/location, chairperson(s), membership from the other disciplines on the panel, and logistical information. The SAR Agenda shall also include a preview of the activity detailing the agenda items and the panel activities. For example, it should have an introduction, an overview of the product, and a status of the product. It should also include, as a minimum, the status of previous reviews, summary of the status of sub-tier items, availability of supporting documentation, open action items, significant issues, open work, ADP status, delivery schedule, and the schedule and plan for the review.

3.6.3 Acceptance review activities.

At the beginning of an SAR, a brief summary, as outlined in the meeting agenda shall be provided reviewing the status of the product being presented for delivery. The SAR panel shall review and reconcile any changes or deltas to the Product Baseline (PBL), established during the PCA to determine the true configuration of the deliverable item(s). The SAR panel members shall, if deemed necessary, review any applicable documents affected by the deltas. They shall verify all changes are incorporated, and the documents are compliant. Members of the SAR Panel shall also ensure that the product has successfully completed all functional testing and that any discrepancies have been resolved. The supporting Acceptance Data Package shall be examined for completeness and compliance and to verify that any remaining authorized open work is documented. The SAR shall include review of required data elements, signed certifications, and approval signatures. The guidelines the SAR panel will follow in accepting the hardware are provided in Table IV.

TABLE III SYSTEM ACCEPTANCE REVIEW READINESS ASSESSMENT GUIDELINES

The following questions shall be addressed, as a minimum, at the System Acceptance Review Readiness Assessment meeting. These questions will form the basis for the development of a Readiness Assessment checklist.

No.	Question To Be Addressed
1	Has a product baseline been established?
2	Have all actions from previous reviews been closed?
3	Have all scheduled activities been successfully completed, e.g., manufacturing, assembly, disassembly, testing?
4	Have changes to established product baseline been identified, statused, and assessed for impact?
5	Is supporting data available for review (i.e., vendor ADPs, list of MRBs and non-conformances, manufacturing and inspection documentation, engineering drawings, etc.)?
6	Is a Configuration Status Accounting Record containing change incorporation status available?
7	Are all drawings and drawing trees, including ICDs available, as required?
8	Is all manufacturing build paper closed?
9	Are acceptance tests documented and approved?
10	Are any GIDEP Alerts or PRACA reports open on this item?
11	Is the deliverable ADP complete (per SSP 30695 requirements) and available?
12	Has a shipping document (DD 1149, DD-250, or equivalent) been coordinated with and reviewed by the receiving organization?
13	Has the customer given contractual authority for open item and/or shortage acceptance?

TABLE IV GUIDELINES FOR ACCEPTANCE OF HARDWARE DELIVERABLE ITEMS

No.	Question	Guideline
1	Are all development, manufacturing and testing for the item being presented complete?	Manufacturing, testing, and software development must be complete to adequately assess the acceptability of the product. Any work remaining open after delivery shall be documented and authorized.
2	Are the approved hardware and software specifications available for reference?	The item specifications and any changes shall be approved by the proper authority. Verify that hardware and software specifications have been upgraded to reflect approved changes.
3	Are Acceptance Test Procedures and final test reports complete, approved, and available for review?	ATPs and final test reports shall be complete, analyzed, and approved for review and assessment for acceptability during AR. Verify that test data recorded falls within the range required per the ATP and that there is evidence that supplier's QA and NASA representative witnessed the test.
4	Is supporting documentation (i.e., engineering drawings, supplier ADP, fabrication and inspection records, list of MRB and non-conformances, etc.) available for reference, if required?	Any supporting documentation shall be readily retrievable for review during AR.
5	Does the item being presented for acceptance meet contract and specification requirements?	Through verification, traceability analysis, and demonstration, the item must meet all contractual and specification requirements for acceptance.
6	Is the deliverable Acceptance Data Package complete and available for review?	An ADP shall be provided for review at AR. The ADP shall be assembled in accordance with SSP 30695.
7	Are there any differences between the approved product baseline and the configuration of the item being presented for review?	Any deltas between the configuration of the item being presented and the approved product baseline shall be documented, reconciled, authorized and approved. Also verify that any differences between the configuration of the qualified unit and the unit being delivered have been approved and do not affect the validity of the test or acceptance of the flight hardware.
8	Have all changes to the established PBL been processed through the appropriate approval cycle?	Any and all changes to the established PBL shall be released through a formal change management approval system.
9	Is a Configuration Status Accounting Report complete and available for review?	The configuration of the item being presented and complete history of any changes to the configuration item and/or documentation (including change status and effectivity) shall be adequately and accurately recorded in a CSA system.
10	Have all open actions from previous reviews been closed?	All actions from previous reviews (including components, subassemblies, etc., of the item being presented) shall be closed. Any actions remaining open shall be appropriately documented and authorized as a ship short or open item against the item being presented for acceptance.
11	Are there any GIDEP Alerts or PRACA reports open against this item?	All GIDEP Alerts or PRACA reports shall be closed prior to acceptance of the item being presented. This includes any issue components, sub-assemblies, etc., of the item. Any open issues shall be appropriately documented and authorized as an open item against the item being presented for acceptance.
12	Are there any open discrepancies, non-conformances, unexplained anomalies, etc., against this item?	Any open discrepancies or non conformances affecting the item (including any open items against components, sub-assemblies, etc., of the item) shall be appropriately documented and authorized as an open item against the item being presented for acceptance.
13	Is the shipping document (DD Form 1149, DD Form 250, or equivalent) complete and available for review?	The shipping document shall accurately identify the item being delivered and any open or ship short items against the item being presented for acceptance.
14	Have all ship short items been appropriately documented and authorized?	All ship short or open items shall be authorized by the receiving organization and documented in the ADP and on the shipping document.
15	If applicable, are instructions available for special handling, shipping, storage, preservation, packing, and packaging of the item?	Any special handling instructions, including environmental constraints, identification of hazards, maintenance requirements and user manuals shall be incorporated and/or included with the shipment.

3.6.3.1 Configuration management.

The Configuration Management members of the AR panel will be responsible for identifying any deltas between the approved product baseline (PBL) and the configuration of the item being presented for acceptance. They will verify that change documentation has been properly and accurately processed and implemented into the CI documentation. Once this is accomplished and inputs from Engineering and Quality Assurance are received, Configuration Management shall lead a joint reconciliation of the PBL. Configuration Management members will be responsible for providing status of their open and/or closed action items/issues from the PCA that affects the deliverable hardware or software. The Configuration Management members shall also review and ensure correct assembly of their applicable sections of the ADP.

3.6.3.2 Engineering.

The Engineering members of the SAR panel will provide any documentation (updated released drawings, etc.) necessary for the reconciliation of the deltas between the approved PBL and the configuration of the product being presented for acceptance. The Engineering members will be responsible for providing status of their open and/or closed action items/issues from the PCA that affects the deliverable hardware or software. The Engineering members shall review and ensure correct assembly of their applicable sections of the ADP.

3.6.3.3 Quality assurance.

The Lead Quality Assurance members are the co-chairs of the SAR panel. The QA members of the AR panel will provide documentation (updated Indentured Parts List) necessary for the reconciliation of the deltas between the approved PBL and the configuration of the item being presented for acceptance. The QA members of the panel shall provide status of their open and/or closed action items/issues from the PCA that affects the deliverable hardware or software. The QA members shall review and ensure correct assembly of their applicable sections of the ADP.

3.6.3.4 Program management.

The contractor's Program Management will be responsible for coordinating the formal written authorization between NASA and the contractor to ship hardware/software when open items, ship shorts, etc. exist.

3.6.4 Acceptance review action items.

The QA co-chairs shall ensure that appropriate action items are written when warranted by a discrepancy identified by any panel member during the SAR. These action items shall be reviewed at the end of panel deliberations each day. The SAR action items will indicate if the hardware may be delivered without closure of the action item. Close-out of the action items is the responsibility of the SAR panel co-chairs. The co-chairs shall ensure that all action items are closed in accordance with a closure plan.

3.7 Failures, anomalies, and discrepancies.

Any test failures or anomalies occurring during hardware acceptance testing (1) logged into the contractor's Problem Reporting and Corrective Action System (PRACA), and (2) will be analyzed before proceeding with the testing. Items failing to pass Acceptance Test requirements shall be evaluated and reported in the PRACA. Corrective actions implemented shall be detailed in a Problem Report. Only those items failing a test shall require re-testing, unless it can be demonstrated that other test results have been compromised as a result of the failure. The need for performing successfully completed tests as a result of a failed test will be evaluated on a case-by-case basis. All instances of test failure and resultant actions and retest shall be logged and included in the hardware Acceptance Data Package.

Discrepancies identified during other acceptance process reviews and audits will be addressed as they occur. Items that cannot be satisfactorily resolved will be carried as open action items. To the extent practical, the acceptance process will move forward unless the discrepancy is so critical that downstream acceptance activities could be impacted or compromised. Every attempt will be made to resolve open items/discrepancies before the hardware is delivered. Where this is not possible, concurrence shall be obtained from NASA GRC to carry the open item(s) or discrepancies through hardware delivery.

Closure of open items following delivery shall be as directed by NASA.

4.0 NOTES

APPENDIX A ACRONYMS AND ABBREVIATIONS

A.1 Scope.

This appendix lists the acronyms and abbreviations used in this document.

A.2 List of acronyms and abbreviations.

ADP	Acceptance Data Package
SAR	System Acceptance Review
ARIS	Active Rack Isolation System
ATTR	Acceptance Test Readiness Review
CI	Configuration Item
CIR	Combustion Integrated Rack
CSCI	Computer Software Configuration Item
FCA	Functional Configuration Audit
FCF	Fluids and Combustion Facility
FIR	Fluids Integrated Rack
GRC	Glenn Research Center
GSE	Ground Support Equipment
ISPR	International Standard Payload Rack
ISS	International Space Station
KSC	Kennedy Space Center
NASA	National Aeronautics and Space Administration
PBL	Product Baseline
PCA	Physical Configuration Audit
PRACA	Problem Reporting and Corrective Action
SAMS	Space Acceleration Measurement System
TSC	Telescience Support Center